CLAIMS

What is claimed is:

1   1.   A broad-angle multilayer (ML) mirror comprising a multiple layer

2   structure to provide uniform reflectivity over a wide range of angles with small

3   phase shifts.

1   2.   The ML mirror of claim 1 wherein the ML mirror provides an acceptance

2   angle in excess of 20° without a significant loss of reflectivity.

1   3.   The ML mirror of claim 2 wherein the loss of reflectivity is approximately

2   17%.

1   4.   The ML mirror of claim 1 wherein the ML mirror increases the relative

2   phase shift.

1   5.   The ML mirror of claim 1 wherein the ML mirror comprises a 13.5nm

2   central wavelength.

1   6.   The ML mirror of claim 1 wherein the structure comprises:

2   a substrate layer; and

3   a plurality of bi-layers to provide a 13.5nm central wavelength.

1   7.   The ML mirror of claim 6 wherein the plurality of bi-layers have a variable

2   thickness.

1   8.   The ML mirror of claim 6 wherein the plurality of bi-layers include thirty-

2   six bi-layers.

1   9.   The ML mirror of claim 6 wherein the bi-layers are comprised of Mo/Si

2   bi-layers.

1   10.   The ML mirror of claim 6 wherein the bi-layers are comprised of Mo/Be

2   bi-layers.

1   11.   An optical system having an extreme ultra-violet (EUV) radiation source,

2   the system comprising:

3   a mask;

4   a wafer; and

5   a plurality of reflecting surfaces for imaging the mask on the wafer,

6   wherein one or more of the plurality of reflecting surfaces includes a broad-angle

7   multilayer (ML) mirror having a multiple layer structure to provide uniform

8   reflectivity over a wide range of angles with small phase shifts.

1   12.   The system of claim 11 wherein the plurality of reflecting surfaces

2   comprises six mirrors.

1   13.   The system of claim 11 wherein the ML mirror provides an acceptance

2   angle in excess of 20° without a significant loss of reflectivity.

1 14. The system of claim 13 wherein the ML mirror has a loss of reflectivity of

2 approximately 17%.

1 15. The system of claim 11 wherein the ML mirror increases the relative phase

2 shift.

1 16. The system of claim 11 wherein the ML mirror comprises a 13.5nm central

2 wavelength.

1 17. The system of claim 11 wherein the mirror comprises:

2 a substrate layer; and

3 a plurality of bi-layers to provide a 13.5nm central wavelength.

1 18. The system of claim 17 wherein the plurality of bi-layers have a variable

2 thickness.

1 19. The system of claim 18 wherein the plurality of bi-layers include thirty-six

2 bi-layers.

1 20. An optical system having an extreme ultra-violet (EUV) radiation source,

2 the system comprising:

3 a mask;

4 a wafer; and

5 a plurality of reflecting surfaces for imaging the mask on the wafer,

6   including:

7   a first mirror;

8   a second mirror,

9   a third mirror having a multiple layer structure to provide uniform

10   reflectivity over a wide range of angles with small phase shifts;

11   a fourth mirror;

12   a fifth mirror; and

13   a sixth mirror.

1   21.   The system mirror of claim 20 wherein the third mirror provides an

2   acceptance angle in excess of 20° without a significant loss of reflectivity.

1   22.   The system of claim 21 wherein the third mirror has a loss of reflectivity of

2   approximately 17%.

1   23.   The system mirror of claim 22 wherein the third mirror comprises a

2   13.5nm central wavelength.

1   24.   The system of claim 20 wherein the third mirror comprises:

2   a substrate layer; and

3   a plurality of bi-layers to provide a 13.5nm central wavelength.

1   25.   The system of claim 24 wherein the plurality of bi-layers have a variable

2   thickness.

1   26.   The system of claim 24 wherein the plurality of bi-layers include thirty-six

2   bi-layers.